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**A REVISION OF THE TERTIARY SPECIES OF ARCA OF THE EASTERN
AND SOUTHERN UNITED STATES.**

BY ANGELO HEILPRIN.

In the following enumeration I have reduced all the species to the single genus *Arca*, the various modifications of form and ornamentation not appearing to me to be either sufficiently well marked, or of sufficient importance, to constitute points for generic subdivision. The *Arca gigantea* and *A. onochela* are forms which would fall in the subgenus *Cucullæa*.

The names in parentheses are those under which the species are indicated in the "Smithsonian Check Lists" of 1864 and 1866; they are repeated here merely to facilitate comparisons with those lists, and in no way represent the views of the author on the subject of generic relationship.

EOCENE.

- A. aspera** Conr. (Barbatia; Calliarca) *Jacksonian*. Miss.
Proc. A. N. S., vii, p. 258, as *Navicula*.
- A. cuculloidæ** Conr. (Cucullarca). Ala.
Tert. Foss., 1st ed., p. 37.
- A. gigantea** Conr. (Latiarca). Md.
J. A. N. S., vi, p. 227.
- ? **A. lima** Conr. *Jacksonian*. Tex.
J. A. N. S., 2d ser., p. 125, as *Byssarca*.
A. (Byssarca) Mississippiensis Conr. J. A. N. S., 2d ser., p. 125
(young).
Cibota Mississippiensis Gabb. J. A. N. S., iv, 2d ser., p. 387.

I am somewhat doubtful as to the correct determination of his species by Gabb.

- A. onochela** Rogers (Latiarca). Va.
Trans. Am. Phil. Soc., 1839, p. 372, as *Cucullæa*.
Latiarca idonea Conr. Proc. A. N. S., 1872, p. 53 (no locality).

This species appears to be very closely related to, if not identical with the *Cucullæa crassatina* of Lamarck, from the lower Soissonais sands of the Paris basin, and possibly also from the British Bognor rock.

- A. protracta** Rogers (Anacra). Va.
Trans. Am. Phil. Soc., new ser., v, p. 332.

I have seen no specimen of this species, and therefore rely solely upon the description and figure as given by Rogers; I am inclined to doubt its validity.

A. rhomboidella Lea. (*Anomalocardia*). Ala
"Contributions to Geology," p. 74.

A. Rogersi Heilpr. Vp.
Arca (Cucullæa) transversa Rogers. Trans. Am. Phil. Soc., 1839,
p. 373. Specific name *transversa*, preoccupied by Say.

I have seen no specimen of this species, and judging from the figures illustrative of Rogers' description it appears as though it may prove to be only a variety of *A. onochela*.

OLIGOCENE.

A. lima Conr. Miss.
J. A. N. S., i, 2d ser., p. 125, as *Byssarca*.
A. (Byssarca) mississippiensis Conr. (young). J. A. N. S., i, 2d ser.,
p. 125.

This species is most closely related to the *A. rudis* Desh., an Eocene, Oligocene and Miocene (?) fossil of western and southern Europe; it differs from the recent *A. Helbingii* Brug. (= *A. barbata* L.?), of which the *A. rudis* is stated by Deshayes to be possibly only a variety, in the strong carination of the posterior slope.

A. mississippiensis Conr. Miss.
J. A. N. S., i, 2d ser., p. 125.

A. subprotracta Heilpr. Miss.
Conrad, J. A. N. S., i, 2d ser., p. 126, as *Byssarca protracta*; specific name preoccupied by Rogers, Trans. Am. Phil. Soc., new ser., v, p. 332.

MIOCENE.

A. arata Say (*Scapharca*). Md.
J. A. N. S., iv, p. 137. Conr., Mioc. Foss., p. 58.

This species is enumerated on the authority of Say and Conrad; I have seen no specimens of it, and am doubtful whether it is not a form subsequently described under a new name by Conrad. It seems to have been closely related either to *A. limula* or *A. Carolinensis*.

A. brevidens Conr. N. Car.
Mioc. Foss., p. 62.

(Not enumerated in the "Smithsonian Check List" of 1864.)

A. buccula Conr.
Mioc. Foss., p. 60.

N. Car.

(Not enumerated in the "Smithsonian Check List" of 1864.)

A. cœlata Conr. (Barbatia).
Mioc. Foss., p. 61.

N. Car.

A. callipleura Conr. (Scapharca).
Mioc. Foss., p. 54.

Md.

A. Carolinensis Conr. (Nœtia).
Proc. A. N. S., 1862, p. 290, as *A. ponderosa* var. *Carolinensis*.

N. Car.

This species differs from the recent *A. ponderosa* (Say) of the Atlantic coast in having a comparatively longer hinge margin, a much more elongated posterior slope, and the umbones less prominently incurved.

A. centenaria Say (Striarca).
J. A. N. S., iv, p. 138. Conrad, Mioc. Foss., p. 55.
Emmons, Geol. N. Car., 1858, p. 284.

Va.; Md.; N. Car.

This species very closely resembles both in outline and general ornamentation the recent *A. solida* (Brod. and Swby.), but it lacks the posterior carination of that species, and the ribs are much less distinctly beaded.

A. idonea Conr. (Scapharca).
Tert. Fossils, 2d ed., p. 16. Mioc. Foss., p. 55.
Emmons, Geol. N. Car., p. 285.

Md.; N. Car.

A. stilicidium? * Conr. Tert. Foss., 2d ed., p. 15.

* This species is stated by Conrad (Mioc. Foss., p. 55) to be the young of *A. idonea*; I have not seen sufficient specimens of the former to determine this point with positiveness, but the variation scarcely appears to be of specific value. Both species are recorded in the "Smithsonian Check List" for 1864.

The *A. idonea* greatly resembles the *A. incongrua* of Say, a recent species from the southern Atlantic coasts of the United States, from which, however, it can be readily distinguished by several well-defined characters. In *A. idonea* the anterior ribs are narrower than the interspaces, whereas, in *A. incongrua* (where the ribs are much more prominently transversely barred) the reverse is very decidedly the case. Again, in *A. idonea* the hinge area is marked with several "diamond-shaped" longitudinal impressions, while in *A. incongrua* it is transversely striated. The shell in the recent species is also much more prominently inequivalve.

- A. incile** Say (Anadara). Va.; N. Car.
 J. A. N. S., iv, p. 139. Conrad, Mioc. Foss., p. 56.
 Emmons, Geol. N. Car., 1858, p. 284.
- A. lienosa** Say (Scapharca). N. Car.
 American Conchology, Pl. 36, fig. 1.
 Emmons, Geol. N. Car., p. 284.

This species appears to be undistinguishable from the recent *A. Floridana* Conr., the specific name of which will consequently have to be replaced by that of Say's species, which has priority.

- A. limula** Conr. (Nætia). Va.; N. Car.
 Tert. Foss., 2d ed., p. 15; Mioc. Foss., p. 60.
- A. Marylandicus** Conr. (Barbatia). Md.
 Mioc. Foss., p. 54, as *Byssarca*.
- A. plicatura** Conr. (Scapharca). N. Car.
 Mioc. Foss., p. 61.
A. improcera Conr. Mioc. Foss., p. 60 (young).
A. lineolata Conr. Mioc. Foss., p. 61.
A. æquicostata * Conr. Mioc. Foss., p. 60.

* I have seen no authenticated specimens of this last, but feel satisfied that it is no other than the *A. lineolata*, with the description of which it thoroughly agrees. A specimen of *A. lineolata*, so marked by Conrad, is the one from which the figure of *A. æquicostata* in Mioc. Foss. (Pl. 31, fig. 6) has been taken.

The *A. plicatura* (I have retained the name as best illustrative of the specific character of the fossil) differs principally from the recent *A. transversa* of Say in being a less capacious shell, and in having the posterior slope much less distinctly angulated or carinated. The young shells of both species appear to be undistinguishable from each other, and although there are sufficiently well-marked characters separating the full grown, I have but little hesitation in believing that the coast shell of the present day (which appears also as a post-Pliocene fossil) is only a derivative from the fossil form. The *A. plicatura* recalls the *A. diluvii*, from the European Miocene deposits.

- A. propatula** Conr. (Barbatia). Va.
 Proc. A. N. S., i, p. 323; Mioc. Foss., p. 61.
 ? *Arca hians* Tuomey and Holmes. Plioc. Foss., p. 34.

The figure of this species in the "Pleocene Fossils," very closely resembles the type specimen of Conrad's *A. propatula*, and I have but very little doubt (although I have not seen an

authenticated specimen of *A. hians*) that the two species are in fact identical, despite the supposed distinctions pointed out by Tuomey and Holmes.

- A. scalaris* Conr. (Scapharca) N. Car.; Va.
Proc. A. N. S., i, p. 324; Mioc. Foss., p. 59.
- A. subrostrata* Conr. (Scapharca). Md.
Proc. A. N. S., i, p. 30. Mioc. Foss., p. 58.
A. tenuicardo Conr. Am. Journ. of Conchology, v, p. 39.
- A. subsinuata* Conr. (Scapharca). N. Car.
Mioc. Foss., p. 62.
- A. transversa* Say (Scapharca). Va.; N. Car.
J. A. N. S., ii, p. 269. Conrad, Foss. Shells Tert. Form., p. 15;
Emmons, Geol. of North Carolina, 1858, p. 285.

I have but little doubt that the species here described is one of the various forms of *A. plicatura*.

- A. triquetra* Conr. (Scapharca). Md.
Proc. A. N. S., i, p. 305. Mioc. Foss., p. 59.
= *A. staminea*? Say, "American Conchology," p. 36, fig. 2. (In Say's description the anterior extremity of the shell is described as the posterior, and *vice versa*).

Somewhat resembles the recent *A. rhombea* (Born).

PLIOCENE.

- A. cœlata* Conr. (Barbatia). S. Car.
Mioc. Foss., p. 61. Tuomey and Holmes, Plioc. Foss., p. 36.
- A. centenaria* Say (Striarca). S. Car.
J. A. N. S., iv, p. 138. Tuomey and Holmes, Plioc. Foss., p. 37.
- A. incile* Say (Anadara). S. Car.
J. A. N. S., iv, p. 139. Tuomey and Holmes, Plioc. Foss., p. 35.
- A. incongrua* Say (Scapharca). S. Car.
J. A. N. S., ii, p. 268. Tuomey and Holmes, Plioc. Foss., p. 45.
- A. pexata* Say (Argina). S. Car.
J. A. N. S., ii, p. 268. Tuomey and Holmes, Plioc. Foss., p. 46.
- A. scalaris* Conr. (Scapharca). S. Car.
Proc. A. N. S., i, p. 324. Tuomey and Holmes, Plioc. Foss., p. 43.
- A. lienosa* Say (Scapharca). S. Car.
American Conchology, Pl. 36, fig. 1. Tuomey and Holmes, Plioc. Foss., p. 40.
- A. plicatura* Conr. (Scapharca). S. Car.
Mioc. Foss., p. 61.
A. improcera (young) Conr.; Tuomey and Holmes, Plioc. Foss., p. 41.

† **A. propatula** Conr. (*Barbatia*).

S. Car.

Proc. A. N. S., i, p. 323. Mioc. Foss., p. 61.

Arca hians, Tuomey and Holmes, Plioc. Foss., p. 34. See note under *A. propatula* (MIOCENE).

A. rustica Tuomey and Holmes (*Scapharca*).

S. Car.

Mioc. Foss., p. 39.

I have seen no specimen of this species, and can therefore not pronounce upon its validity. The fragment illustrated in the "Pleiocene Fossils" scarcely admits of recognition.

A. trigintinaria Conr. (*Anadara*).

S. Car.

Proc. A. N. S., 1862, p. 289, as *Anomalocardia*.

Arca Americana, *A. Carolinensis*, *A. incongrua*, *A. lienosa*, *A. pexata*, *A. ponderosa*, and *A. transversa* occur in the post-Pliocene deposits; *A. cælata* is also reported from the South Carolina deposits of that age by F. S. Holmes.